



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>James E. Lawrence</b>	<b>Project Number</b> <b>J0119</b>
<b>Project Title</b> <b>Hull Texture vs. Performance</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This experiment measured the resistance created by different surface textures on identical submarine hull specimens. The textures were GLOSSY, MATTE, GRIT, and GEL. It is expected that the hull with the smoothest texture would have the least resistance. Observing how water beads up on the hulls of the GLOSSY and GEL specimens, one would expect resistance would be lowest with these two specimens. <b>Methods/Materials</b> The identical submarines with different textures were submerged into a test tank filled with water. A controlled pump propelled the water past the submarines at a constant speed measured by a flow gauge. A torsion spring gauge attached to a linear slide measured the frictional resistance (drag) of each submarine. Frictional resistance becomes less important as speed increases so measurements were taken at four different speeds. <b>Results</b> As expected, the GRIT texture demonstrated the most resistance overall. The testing results showed at slow and medium flow rates, the GEL texture performed the best. At the fast flow rate, the GEL and MATTE textures performed best. At maximum speed, the GLOSSY texture had the least resistance. In the entire testing the MATTE texture demonstrated the least resistance over all. <b>Conclusions/Discussion</b> The testing results have shown that the MATTE finish performed best overall, with GEL, then GLOSSY, and then GRIT being the worst. Different finishes performed better at different flow rates. At the slow and medium flow rates, GEL performed the best, at fast flow rate GEL and MATTE performed the best, and at the flank flow rate GLOSSY performed the best.	
<b>Summary Statement</b> This experiment measured the resistance created by different surface textures on identical submarine hull specimens, submerged into a test tank filled with water.	
<b>Help Received</b> My father helped me build the test tank, and my neighbor, CMDR. Lagemann, advised me in the construction.	